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(54) ELECTRICAL CONNECTOR COMPRISING MEANS PREVENTING INADVERTENT UNCOUPLING

(71) We, TRW, INC., a Corporation organized and existing under the laws of the State of Ohio, United States of America, of 1015 South Sixth Street, Minneapolis, State of Minnesota 55415, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to electrical connectors composed of two separable halves or components in which inadvertent uncoupling or separation of the components is prevented.

Various detent mechanisms have been utilized in the past for preventing connectors from becoming accidentally uncoupled. Inasmuch as the purpose of such connectors is to minimize the chances of them becoming inadvertently uncoupled, they perform admirably well in this respect. However, inasmuch as they do resist uncoupling, the resistance must be overcome when the connector is to be deliberately uncoupled. Consequently, the amount of torque that must be manually applied is more than the designer would like to have. In other words, the detent-type of connector is relatively easy to couple, yet relatively difficult to uncouple. Owing to the assurance that the connector will remain coupled, such a shortcoming has been tolerated, particularly where circuit continuity through the connector must be maintained. Also, most detent types have no provision for a detent position to occur at any predetermined torque value. Still further, the detent action is usually initiated well before a complete "lock-up" is effected, thus increasing the likelihood of the connector components being only loosely coupled; this condition is very undesirable in electrical connectors, for permits wear and early mechanical failure to occur in vibration-prone environments.

Other efforts have centered around the use of wedge elements. However, the effort involved is increased, usually during the coupling operation. Of course, the wedging action that takes place progressively increases as the wedge element is forced more tightly between two concerging surfaces. Not only is there more coupling effort required, but the uncoupling effort is also increased due to the tight, tapered fit. One particular arrangement makes use of two mating connector components utilizing a plurality of indentations or holes which move over a plurality of indentations or holes which move over a plurality of balls as the two components are tightened, it becoming more difficult to move the indentations past the balls with the consequence that a locked condition is established. Here again, more effort is required, both when coupling and uncoupling the connector, than there should be, which is a decided drawback in the achieving of the desired goal.

Accordingly, an important object of the present invention is to provide a connector composed of separable parts or components that will remain coupled or mated together until they are intended to be uncoupled. More specifically, an aim of the invention is to provide a connector that will not become inadvertently uncoupled due to vibration.

Another object is to eliminate the need for lock-wiring the connector. In the past, the coupling ring has been mechanically wired to holes in the mounting flange or to holes in one of the connector components. Obviously, the connector must be "unwired" before it can be uncoupled, which is a nuisance, especially where the connector is installed in cramped quarters.

According to the present invention, an electrical connector comprises first and second components adapted to be mated together along a longitudinal axis, coupling means for causing mating and unmating of said components, drive means rotatable about said axis having abutting means movable therewith for abutting against a portion of said coupling means to rotate said coupling means in one rotative direction to effect said mating when said drive means is rotated in

said one rotative direction, and wedge means shiftable in a circular path about said axis relative to both said coupling means and said drive means, said coupling means having means thereon for shifting said wedge means in its said circular path in said one rotative direction when said coupling means is rotated in its said one rotative direction by said drive means and said wedge means resisting rotation of said coupling means in a reverse direction opposite to said one rotative direction and hence unmating of said components, said abutting means on said drive means abutting said wedge means to render said wedge means ineffectual when said drive means is rotated in a reverse direction opposite to said one rotative direction.

The aforesaid wedge means may include a cam block having a tapered cam surface at the end thereof nearer said abutting means, said coupling means having a complementally configured tapered cam surface. Resilient means may be provided for biasing said cam block in the direction of said cam surface on said coupling means. The aforesaid abutting means for rendering said wedge means ineffectual may include a shoe integral with said drive means for acting against said cam block to urge said block in a direction away from said cam surface on said coupling means when said drive means is rotated in said reverse direction.

In one arrangement, the aforesaid abutting means includes a plurality of angularly spaced shoes integral with said drive means, and said wedge means includes a plurality of cam blocks equal in number to said shoes, each having a tapered cam surface at the end thereof nearer the shoe with which it coacts and said coupling means having a complementally tapered cam surface for each cam block, said shoes acting against said cam blocks to urge said cam blocks in a direction away from said cam surfaces on said coupling means when said drive means is rotated in a reverse direction.

It is readily possible to arrange the above-described connector so that it can be both coupled and uncoupled with a minimum amount of manual effort. In this regard, a certain amount of torque is required in effecting the coupling of any connector utilising rotative motion and also a certain amount of torque is required in effecting the uncoupling of such a connector, assuming that the uncoupling procedure is the reverse of the coupling procedure and not of the so-called "quick-release" variety. Consequently, an aim of the invention is to provide a mechanism that will not noticeably increase either the manual effort required to couple or noticeably increase the manual effort needed to uncouple the connector.

The connector can readily be arranged to afford adequate resistance to separation, doing so on a stand-by basis. Stated somewhat differently, the capability to resist any loosening, such as from vibration, remains latent until actually needed, and even then acting only to prevent undesired uncoupling while permitting facile desired uncoupling.

With this construction, there is provided a connector composed of parts that are not apt to break readily. While our connector can be incorporated into a connector embodying the rather common bayonet and helical groove type of coupling action, it also can, even more readily, be employed in the screw-threaded type which obviates the load or pressure imposed on the bayonets of the first-mentioned type. Thus, the load or pressure imposed on the connector parts when practicing the teachings of our invention is better distributed by reason of the greater surface provided by the threads. Hence, our invention enable the purchaser of connectors to select a threaded type of coupling without fearing that the connector will become separated when used in adverse environments, such as where high degrees of vibration are encountered.

The above-described connector possesses especial utility as an electrical connector of the pin and socket variety in which any inadvertent uncoupling is resisted even when the connector has not been fully coupled or mated. Thus, if the pin contacts are only partially inserted into the socket contacts, any tendency for the pin contacts to inadvertently retract from such a partially inserted relationship is effectively resisted in the same manner as when the components are fully mated. Consequently, a careless person might not fully couple the connector components together, yet do so to such a degree that the partially engaged contacts establish electrical continuity to instruments, signal systems, and the like, thereby presenting the appearance that everything is in order. Such a careless person would be apt to ignore any indicia that would denote a fully coupled condition. Hence, when utilizing the present invention, reliability in such partially coupled situations is not appreciably sacrificed, the partially mated condition not being able to progress into a fully unmated condition where electrical continuity would be lost. Instead, the partially mated condition can only progress in the direction of a more completely mated condition where vibration is encountered, this being an important safety attribute.

In one form of construction having first and second electrical connector components, the first connector component includes a shell threaded at one end thereof. A coupling nut is engaged with the threads on the shell of the first component. The end opposite the threaded portion of the nut, this being toward the rear, is specially configured.

There is an inwardly directed flange that slidably and rotatively abuts an outwardly directed flange on the shell of the second component that is to be mated with the first. The specially configured end portion of the coupling nut provides several angularly spaced recesses composed of one section or compartment that accommodates therein a wedge block, the interior of the coupling nut being tapered so as to provide a sloping cam surface against which the wedge block can act. There is a drive ring that encircles the coupling nut, the drive ring having a radial flange provided with shoe elements that extend into the second sections or compartments of the angularly spaced recesses. A compression spring, preferably a resilient rubber pad or perhaps a coil spring, biases each wedge block in the direction of the complementally configured sloping cam surface formed on the interior of the coupling nut. Another spring force, preferably a coil spring, acts against the shoes so as to normally bias the shoes in a rotative direction away from the particular wedge block that it will forcibly shift when the drive ring is reversely rotated in a direction to deliberately effect the uncoupling of the connector components.

In the following description of a number of embodiments of the invention reference will be made to the accompanying drawings in which:—

Figure 1 is a sectional view of one embodiment of electrical connector when the parts or components thereof are fully coupled together;

Figure 2 is a sectional view taken in the direction of line 2—2 of Figure 1;

Figure 3 is a sectional detail taken in the direction of line 3—3 of Figure 2;

Figure 4 is a sectional detail taken in the direction of line 4—4 of Figure 2;

Figure 5 is a sectional view taken generally in the direction of line 5—5 of Figure 1, the view showing the coupling nut devoid of any cooperable parts;

Figure 6 is a sectional view taken generally in the direction of line 6—6 of Figure 1, this view showing the drive ring devoid of cooperable parts;

Figure 7 is a perspective view of one of the wedge blocks utilized in one embodiment of the invention, this embodiment employing a coil spring, as shown in Figure 2;

Figure 8 is an elevational view of a modified wedge block, this embodiment employing a resilient rubber button appearing at the left end thereof, and

Figure 9 is a top plan view of the modified wedge block depicted in Figure 8.

Illustrating out invention is an electrical connector designated generally by the reference numeral 10 in Figure 1. As is customary, an electrical connector is composed of two halves or components which have been labeled 12 and 14, respectively. The component 12 show at the left in Figure 1 includes a metallic shell 16 provided with a mounting flange 18 having holes 20 therein via which the connector 12 can be attached to an appropriate wall or the like. The shell 16 has an annular internal groove 22 which accommodates therein a resilient O-ring 24. Within the shell 16 is a rubber front insulator 25, a rigid plastics retention disc 26 and a rubber grommet 27 in which are held a number of socket contacts 28, only one of which is shown. The shell 16 has an internal shoulder at 29 which extends into a circumferential groove formed around the grommet 27. For a purpose presently to be explained, there is a longitudinal keyway 30 extending inwardly from the right end of the shell 16. Additionally, it will be observed that external screw-threads 32 are provided throughout the end portion through which the keyway 30 extends.

Describing now the connector component 14, it will be perceived that it likewise includes a rigid shell 34. In this instance, the shell 34 is illustrated with a rubber front insulator 36, a rigid plastics retention disc 38 and a rubber grommet 40 therein, the rubber insulator being formed with a forwardly directed lip or rabbet 44, these members all being fixedly retained in the shell 34. The several members 36, 38 and 40 encompass and hold in place any preferred number of pin contacts 46, the precise number corresponding to the number of socket contacts 28 utilized in the component 12. It will be understood that our invention is also susceptible to use in connectors embodying hard face socket insulators instead of the rubber insulators described above and having other types of contact retention mechanism. Although not important to an understanding of the present invention, the shell 34 is formed with external screw threads at 48 for the attachment of a protective shroud or sleeve portion of a cable clamp 52. A key 56 extends radially from the shell 34 and is slidably received in the previously mentioned keyway 30. Also, it will be noted that the shell 34 has formed thereon an outwardly directed flange 58 which abuts the right end of the shell 16 when the components 12 and 14 are fully mated, there being a cylindrical surface portion 60 extending rearwardly from the flange 58. At the rear of the cylindrical surface portion 60 is an annular external groove 62 which receives therein a split ring 64 which performs a function presently to be referred to.

A coupling nut denoted in its entirety by the reference numeral 66 has internal threads 68 that engage the external threads 32 on the shell 16. Although shown and described

as a one-piece construction, the coupling nut can be a composite construction, depending upon design considerations. At any rate, inset from the right end of the coupling nut 66 is an inwardly directed flange 70 intended to bear in a sliding fashion against the outwardly directed flange 58 so as to pull the shell 34 to the left in Figure 1 when the coupling nut 66 is advanced helically to the left.

The insetting of the flage 70 from the right end provides space that is divided into several angularly spaced recesses 72, there being lugs or block portions 74 between the recesses 72 that extend into close proximity to the cylindrical surface 60 that has been previously mentioned. Actually, it is the cylindrical surface that forms the inner wall of each recess 72. It will help the ensuing description, it is believed, to consider each recess 72 as composed of three compartments or sections 76, 78 and 80. A radially directed shoulder 82 constitutes the end wall of the compartment 76. The intermediate compartment 78 has an inwardly sloping cam surface identified by the reference numeral 84. The remaining compartment, which has been given the reference numeral 80, has a shoulder 86 at the end thereof remote from the intermediate compartment 78. For a purpose soon to be explained, there is still another shoulder formed interiorly of the coupling nut 66, this shoulder being given the reference numeral 88. Thus, it is important to appreciate that each recess 72 has a larger compartment 76, an intermediate compartment 78 that provides the cam surface 84, and an additional compartment 80. The shoulders 82 and 86 that have been mentioned are really the walls of the lugs 74. While the word "compartment" has been used, the void formed could be termed a chamber or groove, being open at the right end of the coupling nut 66 as can be appreciated from Figure 5.

Playing an important role in deriving the benefits from the present invention is a drive ring denoted generally by the reference numeral 90. The drive ring 90 loosely encircles the coupling nut 66, and as with the coupling nut can be of composite construction, if design considerations so dictate. Initially, the drive ring 90 has a cylindrical or cup-shaped configuration that permits it to be loosely fitted over the coupling nut 66. The rim or lip thereof is swaged as indicated at 92 so as to prevent the drive ringe 90 from moving to the right as viewed in Figure 1. Any number of flutes or ribs 94 can be disposed around the circumference of the drive ring so as to permit a twisting thereof for a purpose soon to be made manifest. As perhaps best understood from the sectional views shown in Figures 3 and 4, although reference can also be made to Figure 6, there is an inturned radial flange 96 engageable against the right end of the coupling nut 66 as can be discerned from Figure 1. Thus, the swaged lip 92 prevents the drive ring 90 from moving to the right, and the flange 96 prevents the drive ring 90 from moving to the left. More importantly than preventing axial movement of the drive ring 90 with respect to the coupling nut 66 is the fact that the flange 96 supports angularly spaced shoes 98, the shoes 98 being movable with the drive ring 90 when it is rotated in either a clockwise or counterclockwise direction.

The ends of the shoes 98 labeled 100 abut against the previously mentioned internal shoulders 86 on the coupling nut 66. Hence, when the drive ring 90 is rotated in a clockwise direction, the ends 100 of the several shoes 98 abut against the shoulders 86 so as to forcibly rotate the coupling nut 66 in a clockwise direction, such rotation of the coupling nut 66 causing its axial advancement by reason of the internal threads 68 that are engaged with the external threads 32. The shoes 98 are notched as can be seen by an inspection of Figures 2 and 5. Thus, a shoulder is formed at 102 for a purpose soon to be described. This results in a reduced radial thickness 104 throughout the major portion of each shoe 98, the reduced section terminating in a tapered end 106. The convergence of the reduced section will be explained shortly. At this time, however, reference will be made to a coil spring 108 that is interposed between the internal shoulder 88 on the coupling nut 66 and the shoulder 102 on the particular shoe. The several coil springs 108 resiliently bias the shoes 98 in a clockwise direction as viewed in Figure 2. However, the biasing action provided by the various coil springs 108 can easily be overcome when the drive ring 90 is rotated in a counterclockwise direction.

While the various shoes 98 are disposed within the compartments or chambers labeled 80, the larger compartments 76 have contained therein, there being one for each compartment, a plurality of wedge or cam blocks 110. One form of wedge block 110 is shown in Figure 7. Having mentioned the tapered cam surface 84 on the interior of the coupling nut 66, this being in the region of the intermediate compartment 78, it will be perceived that a complemental sloping or tapered cam surface 112 is formed adjacent one end of each of the wedge blocks 110. The end of the wedge block 110 nearer its shoe 98 is notched at 114. Thus, the end of the shoe 98 that is labeled 106 can extend into the notch 114 when the shoes 98 are to kick or shift the various wedge blocks 110 when the drive ring 90 is rotated in a counterclockwise direction.

Extending inwardly from the other end

115 of each wedge block 110 is a bore or passage 116 that contains therein a coil spring 118, the projecting end of the coil spring 118 abutting the shoulder 82 on the interior of the coupling nut 66. In other words, the various coil springs 118 bias their respective wedge blocks 110 in a clockwise direction as far as Figure 2 is concerned, thereby tending to cause the tapered or cam surface 112 on each wedge block 110 to bear against the complementally configured cam surface 84 formed on the interior of the coupling nut 66. The shoes 98 can very easily overcome the biasing action of the individual coil springs 118 to cause the wedge blocks 110 to be forced in a counterclockwise direction so that the cam surface 112 thereon is moved away from the cam surface 84 on the coupling nut 66. To enable the wedge block 110 to be used for different sizes of connectors 10, that is, different diameters of the portion 66, the section thereof intermediate its ends 114, 115 is arced or concaved upwardly as indicated by the reference numeral 120. In this way, rounded portions 122, 124 are formed and these rounded portions are the only portions that contact or ride on the surface 60.

Although the illustrating of coil springs 118 lends itself nicely to pictorially explaining the biasing of the wedge blocks 110 in a clockwise direction as viewed in Figure 2, the use of springs 118, especially the forming of the bores 116, is more costly. Therefore, the fabrication costs can be reduced by employing modified wedge blocks 110*a*, one of which is illustrated in Figures 8 and 9. Instead of the coil spring 118, a resilient rubber pad 118*a* is utilized, the end of the block 110*a* being slightly notched at 116*a* (seet Figure 9) to accommodate this resilient element. As with the coil spring 118, the pad 118*a* compresses to allow dislodgment.

The annular groove 62 formed around the shell 34 of the component 14 has already been alluded to. The purpose of this groove 62 is to receive therein the split ring 64 that projects radially therefrom to a sufficient degree so as to be engaged by the flange 96 on the drive ring 90 when the drive ring is rotated in a counterclockwise direction.

Having presented the foregoing information, the manner in which the electrical connector 10 operates should be readily understood. Nonetheless, a recapitulation of what has been said, coupled with the procedures to be followed, will enable a better appreciation of the benefits that can be derived from a practicing of the invention. It must be borne in mind, though, that a principal object of the invention is to prevent separation of the components 12 and 14 when installed in environments where a considerable amount of vibration is encountered.

Assuming now that the component 14 is to be mated or coupled with the component 12, it should be recognized that at this time the coupling nut 66 is completely separated from the shell 16 of the component 12. In other words, the component 14, the coupling nut 66 and the drive ring 90 all constitute a single unit. To effect a mating of the contacts 46, the operator merely aligns the key 56 with the keyway 30, moves the component 14 forward, and then starts to twist the drive ring 90 in a clockwise direction as viewed in Figure 2.

By rotating the drive ring 90 in a clockwise direction, it will be understood that the several shoes 98, which are integral portions of the drive ring 90, move in unison in a clockwise direction, the ends labeled 100 of the shoes abutting the shoulders 86 of the coupling nut 66. This provides a metal-to-metal contact between the drive ring 90 and the coupling nut 66, the shoes 98 serving as intermediaries that transmit the rotational motion of the drive ring 90 to the coupling nut 66. With the internal threads 68 of the coupling nut 66 engaged with the external threads 32 of the shell 16 of the component 12, the coupling nut 66 is advanced axially along the shell 16 of the component 12, the key 56 simply moving longitudinally in the keyway 30 of the shell 16.

During this rotative step, the wedge blocks 110 are moved circumferentially around the cylindrical surface 60 of the shell 34 of the component 14. It will be recognized from Figure 2 that the coupling nut 66 is being rotated in a clockwise direction, this causing the several shoulders 82 to be rotated clockwise also. Inasmuch as the projecting ends of the coil springs 118 bear against the shoulders 82 of the coupling nut 66, a gentle force is transmitted to the various wedge blocks 110 so as to move them along with the coupling nut 66 as it rotates. Of course, the sloping cam surface 84 on the coupling nut 66 is continuously moving in a clockwise direction, always being spaced the same distance from the shoulders 82; the sloping cam surface 84 never under these circumstances interferes with the movement of the several wedge blocks 110.

Consequently, continued rotation of the drive ring 90 in a clockwise direction causes the axial advancement of the coupling nut 66 with respect to the component 12. As the coupling nut 66 is advanced, this being due to the helical configuration of the threads 68 and 32, the inwardly directed flange 70 on the coupling nut 66 rotatively and slidably bears against the outwardly directed flange 58 on the shell 34 of the component 14. In this way, the forward side of the flange 70 acts against the rear side of the flange 58, resulting in an advancing of the shell 34 progressively more into a fully telescoped relation with the shell 16. When a full coup-

ling or mating is effected, then the flange 58 of the shell 34 abuts against the right end of the shell 16, Figure 1 reflecting this condition. When this occurs, then the coupling nut 66 cannot be further advanced.

When the connector 10 is installed in an environment where a considerable amount of vibration is encountered, it can be expected that the coupling nut 66 will tend to vibrate in a counterclockwise direction. If not restrained or prevented, continued vibration would cause the coupling nut 66 to retract axially and ultimately the component 14 will become completely separated from the component 12.

However, this cannot happen when utilizing the teachings of the invention, for as soon as any vibration tendency to rotate in a counterclockwise direction results, the cam surface 84 on the interior of the coupling nut 66 simply acts against the cam surface 112 on the wedge block 110, doing so with respect to all three wedge blocks 110. When this happens, the portions 122 and 124 of the various wedge blocks 110 are simply forced inwardly against the cylindrical surface 60. The greater the vibration, the tighter the wedging is. It must be taken into consideration that no rotative effort or torque is being applied to the drive ring 90 at this time. In other words, the connector 10 is unattended and simply performing its function as a connector, and under these circumstances the unmating of the components 12 and 14 simply cannot be tolerated.

The situation is quite different, though, when a deliberate uncoupling of the component 14 from the component 12 is desired. In this situation, the drive ring 90 is rotated counterclockwise as viewed in Figure 2. Should vibration have occurred so as to cam the wedge blocks 110 against the cylindrical surface 60, then the rotation of the drive ring 90 immediately moves the various shoes 98 in a counter-clockwise direction so as to cause the tapered ends 106 to engage in the notched ends 114 of the wedge blocks 110, the coil springs 118 compressing or yielding sufficiently so as to permit this. Continued rotation in a counterclockwise direction forcibly dislodges the various wedge blocks 110. Stated somewhat differently, the shoes 98 "kick" the blocks 110 in a counter clockwise direction, the coil springs 118 associated with these wedge blocks 110 yielding to permit the dislodgement to occur. Even if there has been no camming action which has resulted in a tight fit between the surfaces 84 and 112, rotation of the drive ring 90 in a counterclockwise direction will cause the shoes 98 to urge the various wedge blocks 110 in a counterclockwise direction with the consequence that the coil springs 118 associated therewith are compressed to the degree necessary to permit the ends 115 of the wedge blocks 112 to abut against the shoulders 82 of the coupling nut 66. Thus, there is a positive drive in a direction to uncouple the components 12, 14, for the wedge blocks 110 would transmit the rotative torque under these circumstances via the shoes 98 and the wedge blocks 110 to the coupling nut 66. Such action simply unscrews the coupling nut 66, the threads 68 travelling helicallyq with respect to the threads 32. During this uncoupling procedure, the inturned flange 96 on the drive ring 90 bears against the radially projecting portions of the split ring 64. Consequently, a pressural action is applied to the split ring 64 which is transmitted to the rigid shell 34, thereby forcing the rigid shell 34 to the right as viewed in Figure 1, the key 56 travelling longitudinally to the right in the keyway 30. Sufficient rotation will completely detach the coupling nut 66 from the shell 16, this resulting when the contacts 46, 28 are completely disengaged.

While it is not planed that only a partial coupling of the components 12, 14 be consummated, such could occur if the operator is careless. From Figure 1, it will be seen that the socket contacts 46 receive therein a considerable length of the pin contacts 28 when the components 12 and 14 are fully coupled together. However, if only a partial coupling of the components is realized, then each pin contact 28 has, say, only its tip received in the socket contact 46 with which it is to be received. Where small currents are involved, this is not a serious disadvantage other than that one might expect the connector 10 to be more vulnerable to being completely uncoupled when subjected to vibrational conditions. However, the same wedging action takes place that transpires when the connector 10 is fully coupled, for any tendency for the coupling nut 66 to rotate in a counterclockwise direction when not actuated by the drive ring 90 causes the camming surfaces 84 to bear against the camming surfaces 112 on the wedge blocks 110. Therefore, it should be readily apparent that a fully mated relationship of the components 12 and 14 need not be attained in order for my invention to be effective. It should be understood that while an uncoupling is prevented under these operational circumstances, any tendency to tighten or to become more fully coupled can, and will, take place, this being very advantageous. Stated somewhat differently, there can never be an "inadvertent" uncoupling but there can be an "inadvertent" coupling which progresses in the direction of a fully mated condition of the components but not in the other direction.

It has been explained that the shoes 98 "kick" the blocks 110 in a counterclockwise direction and that the coil springs 118 yield

to permit the blocks to be dislodged. When utilizing the modified blocks 110*a* (as shown in Figures 8 and 9), the rubber pads 118*a* yield to permit such dislodgment.

WHAT WE CLAIM IS:—

1. An electrical connector comprising first and second components adapted to be mated together along a longitudinal axis, coupling means for causing mating and unmating of said components, drive means rotatable about said axis having abutting means movable therewith for abutting against a portion of said coupling means to rotate said coupling means in one rotative direction to effect said mating when said drive means is rotated in said one rotative direction, and wedge means shiftable in a circular path about said axis relative to both said coupling means and said drive means, said coupling means having means thereon for shifting said wedge means in its said circular path in said one rotative direction when said coupling means is rotated in its said one rotative direction by said drive means and said wedge means resisting rotation of said coupling means in a reverse direction opposite to said one rotative direction and hence unmating of said components, said abutting means on said drive means abutting said wedge means to render said wedge means ineffectual when said drive means is rotated in a reverse direction opposite to said one rotative direction.

2. A connector in accordance with Claim 1 in which said wedge means includes a cam block having a tapered cam surface at the end thereof nearer said abutting means, said coupling means having a complementally configured tapered cam surface.

3. A connector in accordance with Claim 2 including resilient means for biasing said cam block in the direction of said cam surface on said coupling means.

4. A connector in accordance with Claim 3 in which said abutting means for rendering said wedge means ineffectual includes a shoe integral with said drive means for acting against said cam block to urge said block in a direction away from said cam surface on said coupling means when said drive means is rotated in said reverse direction.

5. A connector in accordance with Claim 4 including resilient means for biasing said shoe in a direction away from said cam block.

6. A connector in accordance with Claim 1 in which said abutting means includes a plurality of angularly spaced shoes integral with said drive means, and said wedge means includes a plurality of cam blocks equal in number to said shoes, each having a tapered cam surface at the end thereof nearer the shoe with which it coacts and said coupling means having a complementally tapered cam surface for each cam block, said shoes acting against said cam blocks to urge said cam blocks in a direction way from said cam surfaces on said coupling means when said drive means is rotated in a reverse direction.

7. A connector in accordance with Claim 6 including resilient means for biasing said cam blocks in the direction of said cam surfaces on said coupling means.

8. A connector in accordance with Claim 7 including resilient means for biasing said shoes in a direction away from said cam blocks.

9. A connector in accordance with Claim 8 in which said resilient means for biasing said shoes includes a coil spring for each shoe.

10. A connector in accordance with Claim 9 in which said resilient means for biasing said cam blocks includes a coil spring for each cam block.

11. A connector in accordance with Claim 9 in which said resilient means for biasing said cam blocks includes a rubber pad for each cam block.

12. An electrical connector substantially as hereinbefore described with reference to the accompanying drawings.

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Fig. 1

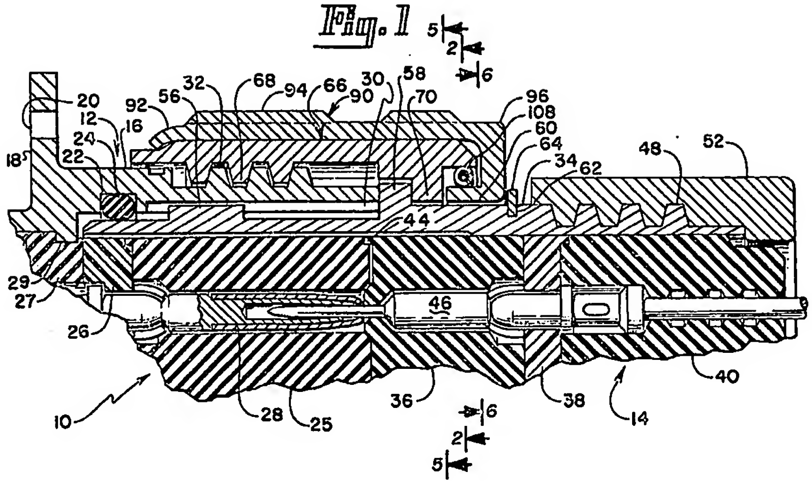
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Fig. 2

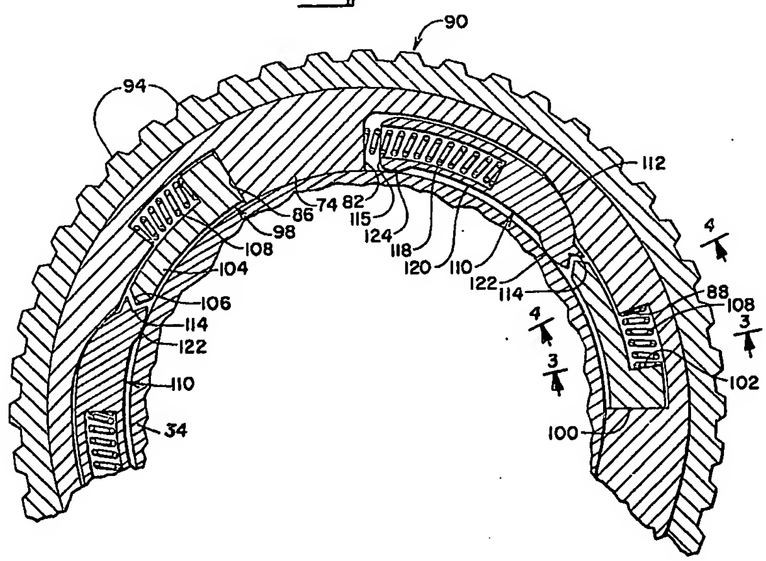
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Fig. 3

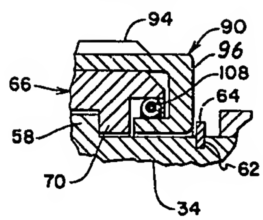

Fig. 4

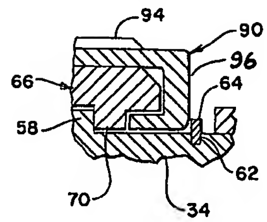

Fig. 7

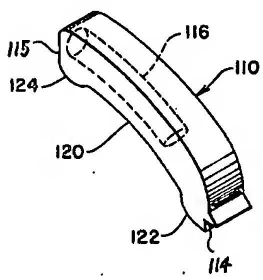

Fig. 8

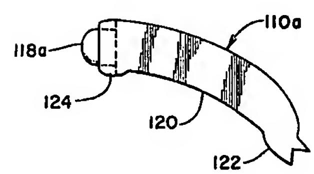

Fig. 9

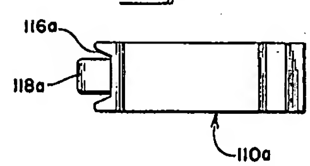

Fig. 5

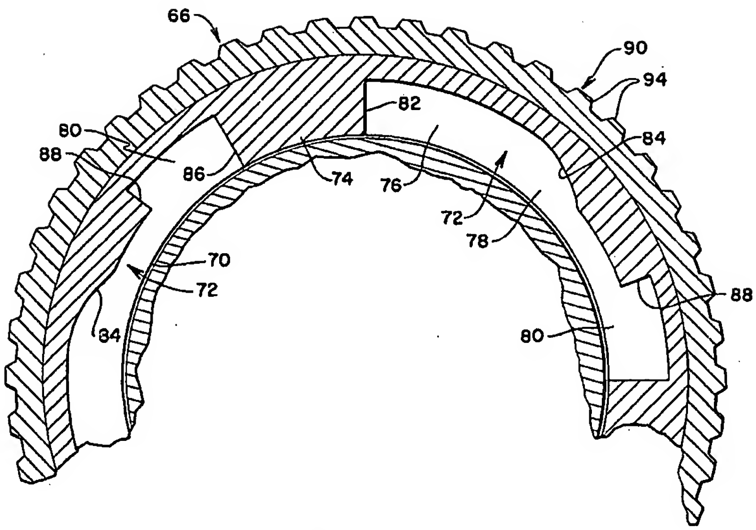
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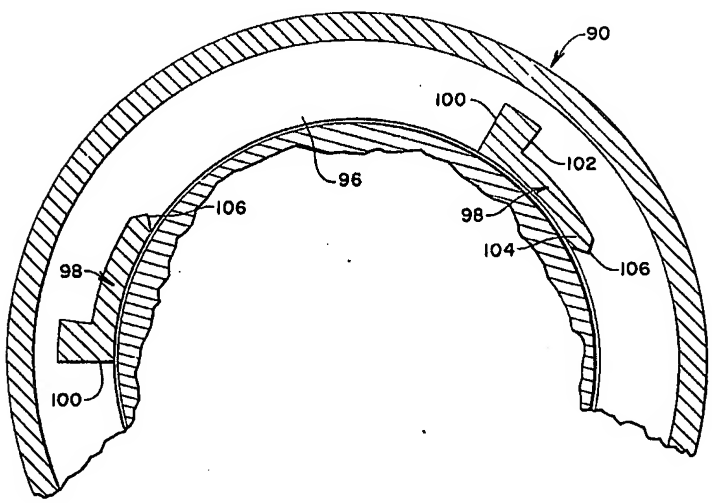
Fig. 6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